AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

Claims 1-10 (cancelled):

Claim 11 (new): An apparatus for producing hydrogen, comprising

a) a reformer stage for converting hydrocarbon gas and water into hydrogen and at least one further reformer product,

b) at least one catalyst stage, connected downstream from the reformer stage, for catalytic conversion of the at least one further reformer product arising during the reforming process,

c) a methanization stage, which is connected downstream from the catalyst stage and has axial flow, to which a flow guiding housing for a coolant extending in the axial flow direction is assigned,

wherein the flow guiding housing has at least two cooling zones having different cooling effects situated one behind another in an axial direction.

Claim 12 (new): The apparatus for producing hydrogen according to claim 11, wherein the coolant is supplied separately to each of the cooling zones.

Claim 13 (new): The apparatus for producing hydrogen according to claim 12, wherein the cooling zones enclose the methanization stage as annular chambers situated one after another or, with a hollow-cylindrical implementation of the methanization stage, are enclosed thereby.

Claim 14 (new): The apparatus for producing hydrogen according to claim 12, wherein each cooling zone has at least one coolant supply connection and one coolant removal connection.

Claim 15 (new): The apparatus for producing hydrogen according to claim 12, wherein each cooling zone may have coolant flow through it alternately in parallel flow or counterflow to the methanization stage.

Claim 16 (new): The apparatus for producing hydrogen according to claim 12, wherein different coolants are supplied to the cooling zones.

Claim 17 (new): The apparatus for producing hydrogen according to claim 11, wherein the cooling zones situated one behind another in the axial direction are directly hydraulically connected to one another, and have different flow cross-sections, the cooling zones alternately having at least one of stepped flow cross-sections and continuously changing flow cross-sections in the axial direction and the cooling zones are adapted to have coolant flow through them alternately in parallel flow or counterflow to the methanization stage.

Claim 18 (new): The apparatus for producing hydrogen according to claim 11, wherein at least one of the reformer stage, the catalyst stage, and the methanization stage are implemented as hollow cylinders.

Claim 19 (new): The apparatus for producing hydrogen according to claim 18, wherein at least one of the reformer stage, the catalyst stage, and the methanization stage are situated one behind another to define a continuous annular chamber in the axial flow direction.

Claim 20 (new): The apparatus for producing hydrogen according to claim 18, wherein the cooling zones, if the methanization stage is implemented as a hollow cylinder, are alternately situated inside and/or outside the methanization stage.

Claim 21 (new): The apparatus for producing hydrogen according to claim 11, wherein the at least one reformer product is carbon dioxide, carbon monoxide or any combination thereof.

Claim 22 (new): The apparatus for producing hydrogen according to claim 11, wherein the flow guide housing has three or more cooling zones.

Claim 23 (new): The apparatus for producing hydrogen according to claim 16, wherein the different coolants are temperature controlled differently.